Patent Claims

1. Semiconducting gas sensor (10; 10a, 10b) with a gas-sensitive layer (5) whose electrical conductivity can be adjusted via contact with a gas, a heater (3) for heating the layer (5) to a predefined measuring temperature, contact electrodes (6a, 6b) for measuring the electrical resistance or the conductivity of the gas-sensitive layer (5), and a chamber (7) in which the gas-sensitive layer (5) is arranged, characterized in that the chamber can be sealed from the outside, and in that the volume of the chamber (7) is small enough that at least one component of the gas or gas mixture inside the chamber is largely exhausted via conversion within a predetermined measuring interval.

2. Semiconducting gas sensor in accordance with Claim 1, characterized by a device for regulating the heating of the gas-sensitive layer (5) in stages, so that individual components of the gas can be selectively converted at predetermined measuring temperatures.

3. Semiconducting gas sensor in accordance with Claim 1 or 2, characterized in that it is or can be produced using micromechanical technology.

4. Semiconducting gas sensor in accordance with claims 1 through 3, characterized in that the heater (3) is a platinum heating resistor which is arranged in a meandering pattern.

5. Semiconducting gas sensor in accordance with Claims 1 through 4, characterized by a passivating layer (4) positioned between the heater (3) and the gas-sensitive layer (5), and made of SiO_2.

6. Semiconducting gas sensor in accordance with Claims 1 through 5, characterized in that the contact electrodes (6a, 6b) are made of platinum.

7. Semiconducting gas sensor in accordance with Claims 1 through 6, characterized by a silicon substrate as the carrier (1) and a nitride membrane (2), which separates the heater (3) from the carrier (1).

8. Semiconducting gas sensor in accordance with Claims 1 through 7, characterized in that the gas-sensitive layer is made of SnO_2, WO_3, titanium oxide, or organic materials such as phthallocyanine.

9. Semiconducting gas sensor in accordance with Claims 1 through 8, characterized in that it is configured for measuring concentrations of CO, NO_2, NO, and/or O_3.

10. Semiconducting gas sensor in accordance with Claims 1 through 9, characterized in that the chamber (7) is or can be made of silicon.

11. Semiconducting gas sensor in accordance with Claims 1 through 10, characterized in that the chamber volume measures 0.05 to 10 cm^3, preferably 0.3 to 0.7 cm^3, and most preferably approx. 0.5 cm^3.

12. Gas sensor system, characterized by several semiconducting gas sensors in accordance with Claims 1 through 11, an arrangement of regulated valves (80), and lines (90) for the inlet and outlet of gas.

13. Gas sensor system in accordance with Claim 12, characterized in that the semiconducting gas sensors (10a, 10b) are arranged in a parallel connection.

14. Gas sensor system in accordance with Claim 12 or 13, characterized in that the valves (80) can be controlled individually.

15. Method of gas analysis with a semiconducting gas sensor, comprising the following steps: preparing a semiconducting

gas sensor (10; 10a, 10b) with a gas-sensitive layer (5) in a sealable chamber (7; 70);
filling the chamber (7; 70) with a gas or gas mixture that is to be analyzed, and sealing the chamber;
heating the gas-sensitive layer (5) in the semiconducting gas sensor (10; 10a, 10b) and/or holding the gas-sensitive layer at a predetermined measuring temperature; examining a measuring signal which is a function of the electrical conductivity of the gas-sensitive layer (5), at a time at which at least one component of the gas has been exhausted via conversion within the chamber to the point at which it no longer supplies any significant contribution to the measuring signal; and
determining the content of at least one remaining gas component from the remaining measuring signal.

16. Method in accordance with Claim 15, characterized in that the measuring signal is examined as a function of time, and the measurement is used at least two different times to determine the gas components.

17. Method in accordance with Claim 15 or 16, wherein the concentration of at least one gas component is determined from the maximum peak of the measuring signal and its subsequent drop.

18. Method in accordance with Claims 15 through 17, wherein the measuring temperature lies within a range of 20° C to 550° C, preferably within a range of 50° C to 400° C, and most preferably within a range of approx. 200° C and/or 400° C.

19. Method in accordance with Claims 15 through 18, wherein the heating is gradual, and measurements are taken at different measuring temperatures.

20. Method in accordance with Claims 15 through 19, implemented using a semiconducting gas sensor in accordance with one of Claims 1 through 11 and/or a gas sensor system in accordance with Claim 13 or 14.

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